

CLAIMS

1. A process for the treatment of water contaminated by apolar organic compounds and/or heavy metals which consists in circulating water through a system comprising at least two types of zeolites having a silica/alumina ratio > 50, placed in succession, wherein the first zeolite through which the water is passed is characterized by a high absorption capacity and structural channel dimensions ranging from 7 to 50 Å, whereas the second is characterized by a high removal capacity of molecules with a molecular diameter comparable with structural channel dimensions ranging from 5 to 7 Å.
2. The process according to claim 1, wherein the zeolites are in the form of formulates with ligands selected from alumina, silica, clay.
3. The process according to claim 2, wherein the ligands form from 20 to 60% by weight of the formulate.
4. The process according to claim 1, wherein the zeolites have a silica/alumina ratio > 200.
5. The process according to claim 1, wherein the zeolite characterized by structural channels having dimensions of 7-50 Å, is selected from the group consisting of Y Zeolite, beta zeolite, MSA, ERS-8 and MCM-41.
6. The process according to claim 5, wherein the zeolite

characterized by structural channels having dimensions of 7-50 Å, is Y Zeolite.

7. The process according to claim 1, wherein the zeolite characterized by structural channels having dimensions of 5-7 Å, is selected from the group consisting of silicalite, ZSM-5 zeolite, Mordenite.

8. The process according to claim 7, wherein the zeolite characterized by structural channels having dimensions of 5-7 Å, is ZSM-5.

9. The process according to claim 1, wherein the water is contaminated by at least one of the apolar organic compounds selected from the group consisting of styrene, p-xylene, benzo-anthracene, benzo-pyrene, benzo-fluoroanthene, benzo-perylene, chrysene, pyrene; halogenated solvents such as carbon tetrachloride, tetrachloro-ethylene, trichloro-ethylene, 1,2-cis-dichloro-ethylene, 1,2-trans-dichloro-ethylene, 1,1-dichloro-ethane, 1,2-dichloro-ethane, hexachloro-ethane, hexachloro-butadiene, vinyl chloride, chloromethane, trichloro methane, 1,1-dichloroethylene, 1,2-dichloropropane, 1,1,2-trichloro-ethane, 1,2,3-trichloropropane, 1,1,2,2-tetrachloro-ethane, monochlorobenzene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, 1,2,4,5-tetrachlorobenzene, pentachlorobenzene, hexachlorobenzene, 2-

chlorophenol, 2,4-dichlorophenol, 2,4,6-tri-chlorophenol, pentachlorophenol, methyl tert-butylether (MTBE), ethyl-tert-butylether, tert-amyl-methyl-ether, BTEX (benzene, toluene, ethyl benzene, xylenes), styrene, naphthalene, 2-methyl-naphthalene, acenaphthene, phenanthrene.

10. The process according to claim 1, wherein the water is contaminated by at least one of the heavy metals selected from the group consisting of Arsenic, hexavalent Chromium, Antimonium, Selenium, Mercury, Cadmium, Cobalt, Nickel, Lead, Manganese and Copper
11. The process according to claim 1, wherein the water is circulated through a system comprising Y Zeolite as first zeolite and ZSM-5 as second zeolite.
12. The process according to claim 1, wherein the apolar organic compounds are present at concentrations ranging from 5 to 2000 ppm.
13. The process according to claim 12, wherein the apolar organic compounds are present at concentrations ranging from 30 to 100 ppm.
14. The process according to claim 1, wherein the heavy metals are present at concentrations ranging from 0.01 to 20 ppm.
15. The process according to claim 14, wherein the heavy metals are present at concentrations ranging from 0.1

to 5 ppm.

16. The process according to claim 1, wherein the water is contaminated by aliphatic, halogen-aliphatic and mono-aromatic molecules and is circulated through a system comprising ZSM-5 zeolite as second zeolite.

17. The process according to claim 1, wherein the water is contaminated by aromatic molecules with two or more aromatic rings, alkyl-substituted halogen, MTBE, and is circulated through a system comprising Mordenite as second zeolite.

18. The process according to claim 1, wherein the water is contaminated by mixtures of hydrocarbons and MTBE and is circulated through a system comprising Y Zeolite, ZSM-5 zeolite and Mordenite, placed in succession, wherein the first zeolite through which the water is passed is Y Zeolite.

19. The process according to claim 1, wherein the treatment is effected on contaminated groundwater and the water is circulated through a permeable reactive barrier (PRB), situated in situ perpendicular to the groundwater flow, whose reactive medium consists of the system comprising at least two types of zeolites.

20. A process for the treatment of water contaminated by 1,2-dichloro-ethane which consists in circulating the water through a system comprising ZSM-5 zeolite alone.